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CITY OF BOSTON.



ANNUAL REPORTS

OF THE

CITY ENGINEER AND CITY SURVEYOR.

1868.

Aug. 1892
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REPORT OF THE CITY ENGINEER.

Office of City Engineer, Boston, Jan. 30, 1868.

TO THE HONORABLE THE CITY COUNCIL OF THE CITY OF BOSTON :

The following statement of matters relating to my department is respectfully submitted, in compliance with the seventh section of the ordinance relating to the Department of Engineering and Surveying.

As this is the first annual report from this department—aside from the one required to be made to the Cochituate Water Board—which has been called for by any rule, order, or ordinance of the city, it may not be amiss to briefly review the origin and progress of this department, and present an outline of its functions and sphere of operations.

The office of City Engineer was first established by an ordinance providing for the care and management of the Boston Water Works, passed October 31, 1850. This ordinance required the Engineer to have charge of all the plans of streets, to make, or cause to be made by his Assistants, for whom he should be responsible, all surveys, admeasurements and levels, and perform such other services as might be required of him by the Mayor, the Board of Aldermen, or any Committee of the City Council. In connection with the Water Works, the Engineer was required to take such charge of Lake Cochituate, the aqueduct, lands, reservoirs and other works and property connected with the Water Works, as the Cochituate Water Board might from time to time direct; and perform all such services in relation thereto as might be required of him by the Cochituate Water Board or the City Council; he was also required to present to the Cochituate Water Board annually, a

report of the general condition of the Water Works and of the expenses of his department, relating to the same, and such other matters as he or the Board may deem expedient.

The Rules and Regulations of the Water Board, as adopted in 1851, conferred upon the Engineer the title of General Superintendent of the Water Works, and prescribed in detail his duties in that department. In 1861, the rules and regulations were revised, the Engineer was relieved of much of the details of the management of the works, and the title of "General Superintendent" abolished. The duties, however, of the Engineer, under the revised rules, remain much the same, so far as his professional services are concerned.

Previous to the passage of the Ordinance above referred to, the engineering and surveying for the city had been done by such Engineers or Surveyors as different City Councils or Committees thereof might select; there was no system, and the care, custody and arrangement of plans were necessarily imperfect. There were, at that time, twelve volumes of miscellaneous plans, in which official and unofficial, valuable and worthless plans were scattered promiscuously; two volumes of Plans and Descriptions of the Streets of Boston, made by John G. Hales, in 1819, by order of the Selectmen, which were never officially adopted, and are only of value now, as showing the widths of the several streets and alleys at that time; two volumes of profiles of the streets in East and South Boston, with the established grades; and one volume of profiles of streets southwest of Dover Street, made with reference to Ezra Lincoln's system of drainage for that section of the city. These were nearly all the city plans at that time, except a few large plans and maps on rollers.

For the first two or three years after the establishment of this department, the accumulation of new plans was so small, that a few drawers sufficed to contain them all, and very little trouble was found in arranging them so that any particular one could

be readily found. A simple classification into "Official Plans," which comprised all plans referred to in Resolves and Orders of the Board of Aldermen or City Council, or in Contracts and Agreements; "South Boston Plans and Profiles"; "East Boston Plans and Profiles"; "City Land Plans"; "Plans in Progress"; etc., was all that was then required. Since that time, the accumulation has been so rapid that a more extended classification has been found necessary, and there are now upwards of twenty different heads under which the plans are now arranged. These different heads are represented by the letters of the alphabet, each letter having one or more drawers assigned to it, in which the plans are arranged by numbers, generally in the order of their date. The plans are nearly all catalogued, each drawer or class by itself, and a general index made of the whole. The following statement shows the present arrangement or system of classification, and the number of plans in each.

Statement showing the Classification and Number of Plans made or collected by this Department since 1850, except duplicates and plans bound in volumes.

DRAWER.	General Head under which Classified.	No. of Plans.
A B and E	Plans from actual survey in the City Proper,	442
C and F	Profiles " " " "	232
M and S	Copies of Plans by other Surveyors "	564
G	South Boston Plans, Profiles, etc.,	239
H	East Boston " " " "	71
D and L	Official Plans, Profiles, etc.,	485
J	Boston Harbor and Ancient Plans of Boston, etc.,	55
R	Copies of Plans from Registry of Deeds,	203
O	Miscellaneous—Back Bay, Public Garden, etc.,	114
N	Plans of City Lands, etc., S. W. of Dover Street,	199†
T	School-house Plans, etc.,	98
V	Bridges,	89
A A	Boston Harbor, etc., large rolled up plans,	31
C C	Miscellaneous, " " "	75
Q 1	South Boston rolled up plans,	8
Q 2	Engraved City Plans " "	10
Q 3	Unfinished Work, " "	4
Q 4	Miscellaneous " "	11
Q 5	Towns and Cities near Boston,	13
Q 6	Miscellaneous,	11
	Total,	2954

The above statements comprise the plans catalogued and indexed. There are Land and Construction Plans of the Water Works, many of which are duplicates of plans in the Water Department, and which are not entered in the catalogue or index, to the number of about three hundred. Besides the foregoing, there are complete plans of the streets of East Boston, fifty-two in number, drawn upon a scale of forty feet to an inch, which exhibit the survey lines and measurements, lineal and angular; the front lines of all buildings, fences and other structures, with offset distances indicating their exact position by figures, in relation to the true line of the streets; the widths of all the streets; the dimensions of all the blocks; the wharves, docks, and the location of the harbor lines as at present established. These plans, and the surveys required to prepare them, were made by John Noble, Esq., for many years Engineer and Surveyor to the East Boston Company. Great care was taken in their preparation, and, together with the note-books of surveys, furnish to this Department the means of determining at once the lines of any street. A similar set of plans of the streets of South Boston, thirty-seven in number, and drawn upon the same scale, have been prepared by Henry W. Wilson, Esq., under the direction of the Commissioners on South Boston Streets. These plans, like those of East Boston were prepared with great care and labor, and indicate the lines of the streets — except the twenty feet ways — as determined and agreed upon by the said Commissioners, and the encroachments, and the location of granite monuments or bounds, one hundred and ninety-six in number, put down by order of the Commissioners to preserve and indicate the lines, and facilitate the labor of giving them. In addition to these sectional plans of South Boston is a general plan of the whole, on a scale of two hundred feet to an inch, drawn in this office, which is the official plan of the streets, signed by the Commissioners and referred to in their report and description of the lines of the streets. There are also large plans on rollers, of South Boston,

made from surveys by Mr. Wilson, under the direction of this Department. These are on a scale of forty feet to an inch, were authorized by an Order of the Board of Aldermen, passed March, 1858, and served as a basis for the subsequent plans above referred to. The system inaugurated by the first City Engineer, E. S. Chesbrough, Esq., of making duplicates of all official plans, and binding them in volumes, has been maintained; and there are now six volumes of these plans containing two hundred and fifty-seven plans; forty-two plans already copied, but not yet bound; forty-nine plans partly copied; and seventy-one plans yet to be copied, so that, when all the official plans up to the present date are copied and bound, there will be about eleven volumes.

Three volumes of the grades of the streets on the Neck lands, southwest of Dover Street, at South Boston, and at East Boston, have also been prepared in this department; which show the grades worked out in detail for the curbstone on each side of the street. The system in vogue before, and for several years after the establishment of this office, of showing the grade of a street by a profile on the centre line thereof, was one liable to occasion mistakes, and for several years has been abandoned, and the present system adopted; which requires, in all official plans establishing the grade of a street, a plan of the street, showing the curbstones on each side, and a separate profile of each side of the street, indicating doors, windows, etc., if the street is built upon.

There is also one volume of thirty-eight sheets of plans and profiles of all the streets in low district, known as the Church Street and Suffolk Street districts.

There are, of plans not made or copied in this office, two volumes of plans of South Cove and miscellaneous plans, containing about one hundred and sixty-six sheets, which were purchased a few years since, and were formerly the property of Francis Jackson, Esq.

Aside from the plans above referred to, which are in the special charge and custody of this department, there have been five volumes containing one hundred and thirty-one plans of the sewers, showing their sizes, grades, location, areas of estates assessed, etc. These plans were prepared by virtue of an Order of the Board of Aldermen passed in August 1857, under the direction of this department, by Wm. H. Bradley, Esq., the present efficient Superintendent of Sewers, — at that time, an Assistant in this department — and are in the custody of the Sewer Department; besides these volumes, are three hundred and forty-eight plans in sheets, also in said Sewer Department. Also twenty plans of the Public Lands on the Neck, showing the lots sold, to whom and when, the dimensions, areas and price per foot; these are in the custody of the Public Land Department, duplicates being preserved in this office. Also two volumes, containing seventy plans of the School-house Lots, and one volume containing twenty-six plans of other Public Building Lots, which are in the custody of the Public Building Department. Also seven plans of the estates in South Boston, prepared by Henry W. Wilson, Esq., for the Assessors' Department, and kept in that office. Also a large number of plans made for the Water Department, duplicates of which have not been retained in this office. Although the foregoing statements indicate a vast amount of work done by or under the direction of this department since 1850, yet a more vivid idea may be given by comparing the total amount done previous to 1850, as indicated by the plans then in the custody of the city, with that done since, as indicated by the plans which have since accumulated. All the plans in possession of the city in 1851, except Water Works plans, were comprised in seventeen volumes; whilst those which have since been made, if all bound in similar books, would make one hundred and twenty-five volumes.

The following statements of the number of persons employed in this department for each year since 1850, also of the total

annual expense for engineering and surveying for the same time, will be found of some interest, and will also indicate a comparatively steady increase in the business of the office and in the duties of the Engineer and his Assistants.

Statement of the number of persons employed under the direction of this Department, including the City Engineer and Assistant; and also of the amounts paid for Engineering and Surveying for each year from January 1851 to the end of the fiscal year 1866.

YEARS.	No. of Persons Employed.	Amount paid from Appropriations for Engineer's Department and Salaries.	Am't charged to other Departments.	TOTALS.
Jan. 1851 to May 1852....	8	\$5,377 95	\$758 97	\$6,136 92
May 1852 " 1853....	13	6,183 46	1,563 90	7,747 36
" 1853 " 1854....	18	7,232 76	1,503 75	8,736 51
" 1854 " 1855....	14	9,378 44	128 75	9,507 19
" 1855 " 1856....	14	9,128 49	150 00	9,278 49
" 1856 " 1857....	14	9,431 14	150 00	9,581 14
" 1857 " 1858....	17	9,062 82	2,047 31	11,110 13
" 1858 " 1859....	20	9,467 36	3,891 78	13,359 14
" 1859 " 1860....	18	9,995 41	1,935 75	11,931 16
" 1860 " 1861....	18	10,278 48	3,843 33	14,121 81
" 1861 " 1862....	21	10,601 85	5,762 05	16,363 90
" 1862 " 1863....	22	10,346 82	6,444 08	16,790 90
" 1863 " 1864....	23	9,191 54	3,469 14	12,660 68
" 1864 " 1865....	16	11,186 09	36 62	11,222 71
" 1865 " 1866....	24	12,924 32	4,498 97	17,423 29
" 1866 " 1867....	28	16,057 64	7,504 33	23,561 97

The foregoing statement comprises all the items of expenditure for engineering and surveying which are to be found in the Annual Reports of the Auditor, and undoubtedly includes everything except certain payments by the Water Board for land surveys on the line of the Works, and sundry small surveys, which amounts do not appear in the published reports, and could only be obtained by an examination of the books of the Water Board. It is also possible that in my examination of the Auditor's Reports, I may have omitted some small amounts; but as the object in preparing the above statement was not so much to exhibit exact figures as to present a comparative view of the growth of the business of the department, these omissions may be deemed unimportant. A certain proportion of the increased expense of this department since 1858 is, of course, owing to a general advance in the wages of employes, amounting to about thirty-five per cent; an increase which is certainly as moderate as that of the other departments, and one which applies mainly to the subordinates in the office, and not to the head of the department, as will be seen by a comparison of the salaries ten years since with those of last year, from which it appears that the salaries of the heads of the departments generally have been increased forty to one hundred per cent, while that of the City Engineer has been increased only seven.

The policy in regard to defraying the expenses of this department has never been uniform. In some years, the cost of engineering and surveys for special objects has been charged to certain departments, and paid out of the appropriation for those departments, or from a special appropriation: for instance, the cost of the surveys and plans of the streets of South Boston and East Boston was paid from the appropriation for laying out and widening streets; the engineering for the South Bay improvements was paid for from the appropriation for the Public Land department, and for South Bay Lands. The Sewer department paid for the surveys and plans of the

location, sizes and grades of sewers; and so on in many other cases. As it is not always easy to draw the line between what may be styled current and special work, I would suggest the expediency of an ordinance, requiring the cost of all work done by or under the direction of this department to be paid from its appropriation. This would ensure a uniform and definite system, and the Auditors' reports, then, would present to the public, under the general head of engineering, the actual cost thereof, which is not now the case.

The Report of the City Surveyor, which is appended, exhibits very fully the nature and amount of work done under his special charge, as required by the present ordinance.

The following statement shows the nature of the work which has been under my special direction and supervision.

South Boston Flats.

Estimates have been made, by request of the Mayor, of the cost of building Eastern Avenue, from the foot of Summer Street to the end of "section one," including a bridge over Fort Point Channel; and of extending B Street from First Street to said Eastern Avenue. Considerable time and attention have also been devoted to the consideration of schemes and plans for the concentration of the freight business of the Southern and Western roads, at tide-water on these flats, and the general question of the occupation thereof.

Annexation of Roxbury.

By request of the Commissioners appointed by the Mayor to consider and report upon the question of the annexation of Roxbury, a plan was prepared of Boston proper and Roxbury, showing the sewers built and proposed in the vicinity of the boundary line between the two cities, and the location and areas

of the low districts in each city which are below a proper drainage level. This plan, and such surveys as were requisite, were made early in the year, and upon very short notice. The plan, so far as the names and location of the streets in Roxbury are concerned, was hastily compiled from a plan by H. F. Walling, made in 1856, and, of course, contained many inaccuracies and omissions. A new plan has since been prepared, showing Boston as it now is, with all the streets, courts, places, squares, churches, school-houses and other prominent public buildings; the location of the horse-railroads, fire-alarm boxes, etc., etc. This is now in the hands of the lithographer, and will soon be published. Besides the preparation of the plan above referred to, for the Commissioners, a great number of calculations of areas, etc., were made by their order, and a variety of estimates and calculations were made by request of the Cochituate Water Board, relative to the distribution of water, and the cost thereof.

Albany Street Wall.

Plans and specifications for this structure, two hundred and seventy-one feet in length, from Dover Street towards Troy Street, were prepared in 1866; but the work was not commenced until early in 1867. A contract was made by the Committee on Paving with Boynton Brothers, and the work has been satisfactorily completed, at a cost, including superintendence, of \$14,041.00.

South Boston Streets.

All surveys required by the Commission on South Boston streets have been made by Henry W. Wilson, Esq.; the official plan, however, hereinbefore referred to, was made in this office, under my direction, during the past year.

This work was commenced in 1865, and the amount expended to January 1, 1868, has been as follows, viz:

To H. W. Wilson and Assistants	\$6,656 68
For Stone Monuments and setting the same .	665 65
For Compiling City Records	168 00
For Stationery, Drawing Paper and Materials .	57 70

Amount expended to January 1, 1868 . \$7,548 03

To this add H. W. Wilson's bill, rendered January 1, 1868, but not yet paid	\$768 75	
Labor, etc., Setting Monument .	7 50	
Compensation of Commissioners and Clerk	\$6,000 00	
		6,776 25
Making the total cost of Surveys, Plans, Monuments, etc.		\$14,324 28

The foregoing amounts were or are to be paid from the appropriation for laying out and widening streets.

Surveys of Public Building Lots.

Surveys and plans of eight Station-house lots, twenty-two Engine-house lots, and five of other public buildings have been made during the year for the Public Building Department. This work of making complete surveys and plans of all the public building lots was commenced in 1865, and would have been completed before the present time, but for the pressure of other work of more immediate necessity requiring the services of the party specially assigned to this particular work. During the present year, it is probable these surveys and plans will be completed, including those in the newly-acquired district of Roxbury.

New Lunatic Hospital.

Levels have been taken over about ninety-five acres of the land in Winthrop, purchased as a site for a new hospital for the

insane, and a plan prepared, showing the contour of the ground as intersected by horizontal planes, at intervals of two feet. This plan will be of great service in determining the most suitable position of the structure, — in case it is built, — and in deciding on the best manner of grading the grounds.

Broadway Extension.

A plan has been made for extending Broadway from Federal Street, in South Boston, to Albany Street at its junction with Way Street, and thence to a point on Washington Street, opposite Pleasant Street. The plan proposed, and upon which the estimates were based, provided for the extension on a high grade, crossing Foundry Street, the Old Colony and Newport Railroad, Fort Point Channel, Lehigh Street and the Boston and Albany Railroad, by iron bridges. The portion between Federal and Foundry streets to be filled solid, the filling to be retained by substantial stone walls; the portions between Foundry Street and the Old Colony and Newport Railroad, and between Fort Point Channel and Lehigh Street, to be built upon cast-iron columns, in a manner similar to the bridge in Berkeley Street, over the Boston and Providence Railroad; the portion between Lehigh and Albany streets, to be filled solid and retained with stone walls, the same as the section between Federal and Foundry streets. The estimated cost of the structures, according to the plan above referred to, was \$395,000.

Water Works.

The duties of the City Engineer, in connection with the Water Works, have been greatly enhanced by the great work now in progress at Chestnut Hill, and a very considerable portion of his time has necessarily been required in connection with this work alone. As a detailed statement of the progress of this work during the past year will be published in my Annual Report to the Cochituate Water Board, it is unnecessary to particularize

now, and I will only say that the work has been prosecuted with all possible vigor, and more was accomplished last year than I anticipated. With equal energy, the work will be nearly, if not quite completed by the close of the present year.

During the year, surveys have been made of lands on the margin of Dug Pond, in Natick. Several examinations of certain portions of the Aqueduct have been made. Observations, for two months, at the East Boston Reservoir, were taken, to determine the points of leakage, and the amount, and a plan for repairs has been prepared and submitted to the Board. A plan for certain alterations in the Pipe Bridge across Mystic River, to accommodate the extension of the Mystic Water Works to Chelsea, has also been prepared, in conjunction with the engineer in charge of said extension.

In connection with the annexation of Roxbury, considerable time has been devoted to the preparation of estimates and calculations in reference to a proposed extension of the pipes in that district, the sufficiency of the supply, etc., etc.

Bridges.

It will be seen by reference to the sixth section of the Ordinance relating to the Department of Engineering and Surveying, that it is made the duty of the City Engineer to make an examination, annually or oftener, of all the bridges, and report as to their condition, etc.

This duty is a new one imposed upon this department, and, so far as the Report is concerned, has never before been assigned to any department.

The following is a list of the bridges which the city has to maintain, viz :

TO SOUTH BOSTON.

Dover St. Bridge, across the mouth of the South Bay.

Federal Street Bridge, across Fort Point Channel.

Mt. Washington Avenue Bridge, across Fort Point Channel.

TO EAST BOSTON.

Chelsea Street Bridge, across Chelsea Creek.

Meridian Street Bridge, across Chelsea Creek.

Point Shirley Bridge, across Chelsea Creek.

Albany Street Bridge, over Boston & Albany Railroad.

Ferdinand Street Bridge, over Boston & Albany Railroad.

Tremont St. Water Pipe Bridge, over Boston & Albany R. R.

The first six bridges are over tide-water, and are in the care of the several superintendents, under the direction of the Committee on Bridges.

The Albany and Ferdinand Street bridges are in the care of the Superintendent of Streets, under the direction of the Committee on Paving.

The Tremont Street Bridge supports the water mains, and is under the care of the Water Board.

Dover Street Bridge.

This bridge was built by a Corporation, under the name of the "Proprietors of the Boston South Bridge," at a cost of \$56,000, and was opened to public travel October 1st, 1805. It was conveyed to the city by deed, dated April 19, 1832, and made free and a public highway.

In 1858-9, the portions inside of the Commissioners' lines were built solid, and that over the flats and channel, outside of said lines, was rebuilt as a pile structure. The total cost, including a new pier and house for the Superintendent, was \$62,564.97. The average annual cost of repairs for a term of seven years immediately preceding the rebuilding of the bridge was about \$2,600.00, and for a term of seven years ending with the fiscal year 1866-67, the average annual cost of repairs was \$2,394.45.

This bridge is now in very fair condition, and will require no extensive repairs the present year. The pier on the southerly side of the bridge, west of the draw, is in quite a shaky condi-

tion, and, whenever the bridge is widened, as proposed, to sixty feet, should be rebuilt, or materially strengthened.

A proposition to widen this bridge, in connection with Fourth Street in South Boston, and Dover Street, as far as Harrison Avenue, was considered by the Committee on Streets of last year, and the estimated expense was \$22,000.00.

Federal Street Bridge.

This bridge was built in 1827-28, by a corporation called "The Boston Free Bridge Corporation." It was surrendered to the city in September 1828.

In 1857-58, the bridge was widened, and, with the exception of such of the piles as were sound and in good condition, was substantially built anew, including piers, new sliding draw, horse power machinery, stable, etc., at a cost of \$50,842.56. The average annual cost of general repairs on this bridge, for a term of six years, ending April 30, 1857, was \$2,292.36; and for a term of seven years, ending April 30, 1867, it was \$1,405.38.

The principal repairs required on this bridge, the present year, will be on the draw and machinery and the piers. The tracks, upon which the draw rolls, need levelling up; in some places new rails and wheels are wanted, and in replacing the wheels—both the travelling wheels and the cog-wheels—it would be well to provide duplicates, to be kept on hand, in case of accident. Some repairs are also needed in the running gear under the barn. A portion of the westerly pier needs replanking; the westerly truss of the draw should be recovered; guard timbers, projecting beyond the surface of the planking of the water ways, should be put in; and sundry small repairs made on the gates and railing.

A proposition to widen this bridge, in connection with Federal Street, to a width of seventy feet, was considered by

the Committee on Streets, of last year, the expense of which was estimated at \$24,500.00.

Mount Washington Avenue Bridge.

This bridge was built in 1854, and accepted by the city April 30, 1855. The total cost to the city was \$61,607.70. There was expended for general repairs, for eleven years, ending April 30, 1867, \$26,920.65, being an annual average expense of \$2,447.33.

There will be a considerable amount of repairs required upon this bridge the present year, chiefly upon the draw. The chords of the trusses are in very bad condition, the ends of many of the braces are rotten, and the wood-work generally needs renewing. The stringers and timbers which form the bulkhead on the outside of the sidewalks are in many places rotten and pressed out of place. The railing needs repairs in some places, and some measures, perhaps the driving of spur-shores, will be necessary to resist the crowding of the bridge on the westerly side of the channel towards the draw. The bridge and draw have been repeatedly cut off, and yet the movement still continues. Some portions of the piers require re-planking, and it is very likely a portion of the flooring of the bridge is defective, and will have to be renewed. A more careful examination of the flooring will be made soon, which will determine this point.

Meridian Street Bridge.

By an Act of the Legislature, passed May 15, 1855, Henry D. Gardner and others were made a corporation by the name of the East Boston Free Bridge Corporation, and authorized to build a bridge across Chelsea Creek, from Condor Street, in East Boston, to Pearl Street, in Chelsea. The franchise became the property of the East Boston Company, and the bridge was built under the superintendence of a joint committee of the City Council, and afterwards purchased by the city.

The total cost to the city, including surveys, plans, models, amount paid the East Boston Company, and the additional amount expended for piers, guards and gates, was \$56,889.85. It was opened for travel in December 1856. There was expended for repairs during nine years after it was built, the sum of \$11,545.64,—an average annual expense of \$1,282.85.

An examination of this bridge, in 1866, revealed the fact that it was in a positively dangerous condition, and unsafe for public travel, and it was decided to rebuild the entire structure, except the draw and pier, which it was then thought could be made good with slight repairs.

Plans and specifications were made in this department, and a contract made with William A. Kenrick, July 2, 1866. By request of the Chairman of the Committee on Bridges, I re-examined the draw, and reported to him, as follows, viz :

“OFFICE OF CITY ENGINEER,

“CITY HALL, BOSTON, March 28, 1867.

“CHARLES R. McLEAN, ESQ.,

“*Chairman of Committee on Bridges :*

“SIR,—I have examined the draw of the Meridian Street Bridge, and find its condition to be very much worse than it appeared a year ago, when examined in connection with the rest of the bridge. It was then thought that very slight repairs would be needed ; but, since the removal of the old bridge and a portion of the flooring of the draw itself, the concealed defects have become apparent, and it appears that the bottom chords of the trusses are so badly decayed that new ones will be necessary for the safety of the structure. There will also be required some additional braces in the trusses, some new timbers in the gallows-frame, and an additional suspension rod. There will also have to be new and more substantial fender-guards, to protect the bridge from vessels approaching the draw. The estimated expense of repairing the draw and building the new fender-guards is \$7,000.

“Respectfully submitted.

“N. HENRY CRAFTS,

“*City Engineer.*

Accordingly, almost the entire frame-work of the draw was re-built, and new fender-guards were built. The bridge was completed, and open to travel early in 1867. The work was superintended by Mr. B. F. Prescott, under the direction of the Committee on Bridges and the City Engineer, and is believed to be one of our most substantial and well-built pile structures. The total cost of the bridge, as rebuilt, and the repairs on the draw, amounts to \$73,749.53.

No repairs of any great amount will be required this year, unless it may be on the moving gear of the draw.

Chelsea Street Bridge.

This bridge was built in 1834, by Benjamin T. Reed and others, who were incorporated as proprietors of the *Chelsea Free Bridge*. It cost \$8,277.76, and was opened to public travel in October 1834. In 1848 it was re-built, at a cost of \$4,678.15, by the Ferry Company, who had previously become the proprietors. May 6, 1850, the Mayor and Aldermen, by virtue of an Act of the Legislature, laid out that portion of the bridge within the limits of Boston, as a public highway. In 1855, by virtue of an order of the City Council, there was paid to the town of Chelsea \$8,473, on condition that said town would give a bond to the City of Boston in the penal sum of \$10,000, to keep that portion of the bridge and road, in the limits of the town, in good order and repair for the future.

This bond was given July 12, 1855, and the bridge is now a public highway, which the two cities of Chelsea and Boston are bound to keep in repair.

The cost of repairs on this bridge, since 1850, has been \$9,721.61, an annual average of \$648.10.

The bridge itself is now in very good repair, and will need very little outlay this year; but the draw and pier are in very bad condition, and should be re-built. The chords and braces of the trusses are rotten, so also are most of the floor timbers.

When the draw is re-built, I would recommend that it be made wider, the present width being only twelve feet.

Chelsea Point Bridge.

This bridge was built by Joseph Burrill and others, who were incorporated in 1835, as the Proprietors of Chelsea Point Bridge, and was opened to public travel in the fall of 1839. Its cost was \$1,100.

That portion of the bridge within the limits of the city was laid out as a public highway July 1, 1850. In 1851 the bridge was re-built at a cost, to the City of Boston, of \$5,720.73. The repairs since 1851 have been very slight, not averaging \$100 a year.

The stringers and bulkhead of this bridge are rotten and need renewal, otherwise the bridge is in fair condition.

Albany Street Bridge.

In 1856-7, a wooden bridge, with a pile structure for the approaches, was built over the Boston and Albany Railroad at a cost of \$23,231.48. This kind of structure was adopted in lieu of an iron bridge with stone abutments and retaining walls, on account of the costly plan which was then proposed for the latter structure. In 1863, the bridge was reported in bad condition, and I was called upon to examine it, and it was found that the piles, which had been coated with coal tar, with a view to their preservation, were already very much decayed with dry rot, and in many places the caps of the piles had been broken by the weight of filling or by heavy loads. The coal tar coating was removed from all the piles, and the decayed portion cut away. Mud sills were put in, and timber shoring used where the piles were much weakened. The expense of these repairs was \$1,238.12. In 1866, the bridge itself was strengthened, at a cost of \$300. These are all the repairs that were made on the old structure.

In May 1867, the Board of Aldermen authorized the erection of an iron bridge, with stone abutments and retaining walls, and this department was called upon to prepare plans and specifications. A plan was accordingly prepared for a wrought-iron lattice bridge, the bars to be made of angle-iron, and the span of the bridge to be sixty-two feet. Subsequently, an agreement was made with the Boston and Worcester Railroad Corporation, by which the span was increased to seventy-three feet, to admit of the widening of their tracks, the Corporation agreeing to pay the additional cost.

A new plan was then made, substituting for the lattice bars panels of boiler plate, thus making a solid plate girder, similar to those erected by the Railroad Corporation and by the city, at Tremont Street. Specifications were also drawn and printed; but a less costly plan on the lattice principle having been submitted to the committee having the matter in charge, by Mr. Clemens Herschel, it was decided to adopt that. Plans and specifications for the abutments and retaining walls were also prepared; and, in July, a contract was made with Messrs. Clapp and Ballou for their erection, and for the removal of the old bridge.

This contract has been so far completed as to allow of the erection of the bridge, which is now in progress, under a contract made in September with Messrs. McKay & Aldus. It is probable that the entire work will be completed, and the street open to public travel, by the first of March. The cost of the entire work to January 1, 1868, including superintendence, was \$47,332.89.

Ferdinand Street Bridge.

This structure was built in 1864-5 by J. E. & N. Brown, by virtue of a contract which was approved by the City Council, but was never executed. It is an iron structure known as Bolles's patent, resting upon stone abutments. It was accepted

in 1865, and has received no repairs since that time, except painting of the iron work, which was done last year at a cost of \$90.00. There is no heavy travel over this bridge, and although it is far inferior in point of stiffness to the plate-girder bridge over the railroad at Tremont Street, it is a very good bridge for the locality.

Tremont Street Water Pipe Bridge.

This structure was built in 1866-67, at the same time that the Boston and Worcester Railroad Corporation built the adjacent road-bridge. The cost of the bridge and the abutments was \$11,245.28; which was paid from the appropriation for laying out and widening streets. The cost of removing and relaying the water pipes was defrayed by the Water Department. By the present arrangement, the sidewalk on the westerly side of the bridge, which was formerly obstructed by an elevated platform covering the pipes, with steps at each end, is now entirely clear; and at the same time, the water pipes are now easily accessible for repairs, while formerly they were encased in an iron box or tube, made of boiler-plate, and laid so close together that it was extremely difficult to get at them to make any repairs. No repairs have been required on this bridge during the past year.

Berkeley Street Bridge (over the Worcester Railroad).

Although this structure is not one for the care and maintenance of which the city is responsible, yet the several petitions for the acceptance of the street, including the bridges, which have been presented from time to time, have furnished the occasion for examinations of this bridge, with especial reference to its fitness and safety.

Reports and estimates in relation to this structure have been made to the Committee on Streets, and to the Mayor, at different

times; and propositions have been made by the President of the Water Power Company, in reference to suitable repairs of the bridge, or a rebuilding of the same; but no definite result has yet been reached. As this street has already become a great thoroughfare and of great public convenience, it is very important that it should be rendered safe; and it is hoped that satisfactory arrangements may be made at an early day, by which the street and bridge may be put in good and safe condition.

STATEMENT OF THE EXPENSES OF THE DEPARTMENT OF ENGINEERING AND SURVEYING FOR THE YEAR ENDING DEC. 31, 1867, AS PAID FROM THE APPROPRIATION FOR THE DEPARTMENT.

Salaries of City Engineer and City Surveyor, Assistants, Surveyors, Levellers, Draughtsmen, Rodmen, etc.	\$17,745 38
Incidental expenses, viz., car fares, tolls, travelling expenses, and small supplies for office . . .	451 97
Books, stationery, drawing paper and materials . . .	734 27
Instruments, and repairing same	923 95
Braid for binding, and cloth for backing plans . . .	96 95
Plan of estates on Blackstone, Centre, Brattle and Elm streets, and Dock Square (Alexander Wadsworth)	86 00
Iron sounding rods	62 62
Wooden stakes	36 22
Repairs and small supplies (not included in incidentals)	22 70
Printing	13 90
Expenses of Committee	17 25
Total	\$20,191 21

The following amounts for engineering and surveying have been paid from other appropriations:

Chestnut Hill Reservoir.

Salaries of resident Engineer and assistants,	
from January 1, 1867, to January 1, 1868, . . .	\$3,828 00
Draughtsmen on gate house, plans, etc.	1,044 00
Incidental expenses, instruments, etc.	55 34
	\$4,927 34
South Boston streets, bills rendered for work	
done in 1867, but not yet paid	776 25
Broadway extension	392 25
Add amount, as above, paid from appropriation	
for this department	\$20,191 21
Total for engineering, for the year 1867	<u><u>\$26,287 05</u></u>

The whole number of persons employed during	
the past year, and paid from the appropriation	
for this department, was	20
The number employed on the engineering and	
draughting for Chestnut Hill Reservoir was	5
Total	<u><u>25</u></u>

Besides the foregoing, a party of three, under Mr. H. W. Wilson, has been employed a portion of the time on surveys for the South Boston Commission, and for the extension of Broadway.

Respectfully submitted,

N. HENRY CRAFTS,
City Engineer.

REPORT OF THE CITY SURVEYOR.

City Surveyor's Office, Boston, Jan. 7, 1868.

To N. HENRY CRAFTS, Esq., City Engineer :

Sir,—In conformity with the 15th Section of the Ordinance relating to the Department of Engineering and Surveying, I submit the following

REPORT :

The following surveys for street widenings, extensions, etc., have been made under my direction during the past year :—

Fort Hill.

The estates on Fort Hill have been surveyed the past year, with the exception of those abutting on Oliver, Belmont, Battery-march and Hamilton streets, and Washington Square, which were surveyed previously; and plans of the same have been nearly completed, showing the buildings, the proposed laying out of new streets, and the widening of the present ones.

Profiles of these streets have also been made, showing the proposed grades to which the streets will have to be cut down.

It will be necessary, before the work progresses much farther, to run base lines over the hill, located from fixed monuments, that will not be disturbed by the removal of the hill, in order to re-locate the new lines of the streets after the buildings have been demolished and the streets cut down to grade.

For the past year, it has required a party, consisting of an

engineer and one assistant, to watch the progress of the excavation in Oliver Street, Washington Square and Belmont Street, to give grades and measure the work done by the contractors. The excavation in these streets has been completed to grade. It is apprehended, however, that in the coming spring considerable quantities of earth will slide off from the steep side slopes into these streets, by the action of the frost. Should this be the case, it will probably be necessary, before this earth is removed, to have it carefully measured, and an accurate account kept of the quantity.

Federal Street.

A survey of this street between the foot of Summer Street and First Street in South Boston, and plans showing the estates on both sides of the street with the proposed line of widening on the easterly side to seventy feet, with the takings from each estate—the street being now about fifty feet in width.

The Board of Aldermen passed a resolve to widen this street in May, but it was not acted upon in the Common Council till near the close of the year, and then failed to pass.

Also a survey and plan of Federal Street between Williams and High streets, showing the line of widening with the takings from each estate.

Another plan of this street was made, between Milk and Summer streets, showing the fronts of the estates, prepared for the purpose of making the assessments under the Betterment Law.

High Street.

A survey and plans showing the estates on both sides of the street between Congress and Summer streets, with the widening to fifty feet and takings from each estate on the northerly side between Congress and Federal streets.

This street was widened on the northerly side between Congress and Federal Streets by a resolve approved July 16, 1867.

Williams Street.

A survey and plan of this street with the estates on both sides of it, and the widening and takings from each estate on the southerly side between Federal and Congress streets.

This street was widened on the southerly side by a Resolve approved July 12, 1867.

Congress Street.

A survey of several takings on this street between Williams and Purchase streets, where the city has widened during the year.

Summer Street.

A survey from " Church Green " to Federal Street, and a plan showing the estates — made for the purpose of fixing upon a contemplated line of widening on the northerly side between High and Federal streets.

No widening made.

Richmond Street.

A survey of this street between Hanover and Salem streets, and plan showing the estates on both sides, and the widening principally on the easterly side, making the street about forty feet in width when widened. Widened by a Resolve approved May 11, 1867.

Also a plan of the street from North to Salem Street, made for the purpose of making the assessments under the Betterment Law.

Devonshire Street.

A survey of this street between Milk and Water streets, and a plan showing the estates on the easterly side through to Congress Street, and the widening on the same side, making the street forty-eight feet in width. Not widened.

Dorchester Street. (Washington Village.)

A survey and plan for the widening of this street, varying from forty-five to fifty feet in width, between Middle Street and the Old Colony and Newport Railroad bridge.

Widened between Middle and Tuckerman streets by a Resolve approved July 15, 1867.

Extension of Kilby Street.

A rough survey for the proposed extension of Kilby Street, from State Street to Faneuil Hall Square, and several plans showing the estates with various routes for the proposed extension of that street; but as it was decided by the Board of Aldermen, after several hearings, not to extend this street, no accurate survey and plans were made.

Change Avenue.

A survey of the estates on both sides of this Avenue, and a plan, showing the proposed line of widening, and the takings from each estate on the westerly side, making the avenue about forty-three feet in width. Not widened.

Adams Street.

A survey of this street and the estates on both sides, with a plan, showing the widening to forty-five feet, and the takings from each estate, also a discontinuance of a portion of the street.

Widened by a Resolve approved November 8, 1867.

Washington Street.

A survey for the purpose of ascertaining the areas of the estates on both sides of the street between Kneeland and Warren streets, and a plan of the same made early in the year to facilitate the making of the assessments under the Betterment Law.

West Street.

A survey and plan of the street, with the widening on the Carter Estate, at the corner of Washington Street. Widened by a Resolve approved March 29, 1867.

Also another plan of the street, showing the fronts of the estates for the purpose of making the assessments under the Betterment Law.

Tremont Street.

A survey for the widening of this street between Boylston Street and the Boston and Albany Railroad Bridge, and plans showing the takings required from each estate to make the street sixty feet in width. The general plan of the street, with the estates, was made several years ago. Not widened.

Extension of Broadway.

A survey for the proposed extension of Broadway, sixty feet in width, from Federal Street in South Boston to Washington Street opposite Pleasant Street, and plans, showing the abutting estates and the takings from each estate. Also profiles of portions of Lehigh, Way, Albany, Curve, Hudson and Tyler streets, showing the proposed grades it would be necessary to raise those streets to, if Broadway should be extended at "high grade" as proposed, passing over Foundry Street, the Old Colony & Newport Railroad, Lehigh Street and the Boston & Albany Railroad.

The Board of Aldermen passed a resolve in November to extend this street from Federal to Albany Street, but the Common Council non-concurred and the subject was referred to the next City Council (1868).

Church Street District.

A rough survey and plan of this territory, with all the estates, was made in the early part of the year. This plan showed all the buildings and the proposed widening of the streets, generally to forty feet in width. Another plan was also made, after the completion of the above plan, showing the proposed laying out of the territory into new streets and lots. These plans were made for a temporary purpose, only to be used by the Committee on the Church Street District and by the City Council during the discussion of the question as to what action the city should take — whether to raise the grade of the territory and widen the streets, or to take all the property within the District and demolish the buildings and lay out new streets and lots.

In the month of November, the City Council passed a Resolve in favor of taking all the property lying within this District, under the Church Street Act (so called), “for the purpose of raising the grade of said territory, and laying out new streets and avenues thereon.” This was merely an expression of opinion of the City Council, without actually effecting any result.

By the advice of the City Solicitor, it was deemed necessary that there should be an accurate survey made, and a plan of the streets, and of each estate in this District, with a description of each parcel of land, before the city could take the property; as a description of each parcel of land to be taken, giving the bounds and dimensions of the estate, is required by the Act to be filed in the Registry of Deeds within sixty days from the time the property should be taken.

This accurate survey was ordered immediately after the passage of the Resolve above referred to, and two parties of Surveyors were put to work at once, and continued on the same without interruption, working days and evenings till the last week in December, when it was found impossible to complete the plan,

so that the subject could be brought before the City Council of 1867 in a tangible form. The surveys are all completed, but the plan is not yet finished, as there are a great many conflicting boundary lines to be first settled, and the ownership of the fee of the unaccepted streets ascertained.

The above statement shows some very extensive surveys for street improvements, more so than have been made during any one year since the City Engineer's Office was established in 1850,—especially the surveys of Fort Hill, Church Street District, the widening of Federal Street from the foot of Summer Street to First Street, in South Boston, the extension of Broadway, and the widening of Tremont Street from Boylston Street to the Boston and Albany Railroad Bridge. There have been so many large surveys, some of which were going on at the same time, that in order to complete them as soon as they were wanted, it has been found necessary to require the assistants at times to work evenings on the plans, and to pay them for extra time.

This increase of work is owing, undoubtedly, in part, to the passage of the Betterment Law in 1866, which necessitates the widening and improvement of streets on a larger and more complete scale (in order that the City may derive any benefit from it) than under the old law.

The above list of streets that have been surveyed and plans made, show the principal work that has been done under my especial charge as City Surveyor during the past year; but there has been a great amount of work done besides, in this department, of a miscellaneous nature, such as the giving of grades and lines of streets, surveys and plans for the Paving, Sewer, Public Building and Public Land Departments, surveys and plans for Water Works, measurement of contractors' work, drafting of plans, etc.

Duties of the City Surveyor.

Besides the duties performed by the City Surveyor in taking charge of the surveys, etc., above enumerated, a large portion of his time is occupied in acting as Secretary of the Committee on Laying out and Widening Streets, and in keeping the books and performing the duties in relation to widening streets under the Betterment Law, as provided in the Ordinance relating to the Department of Engineering and Surveying, as follows:

“SECTION 12. Said Surveyor shall act as Secretary of the Committee on Laying Out and Widening Streets, of the Board of Aldermen, and shall furnish said committee, or such commission as may hereafter be intrusted by the City Council with the consideration of matters appertaining to the laying out, widening, or extending streets, with such plans and information in relation to any projects under consideration by them as they may require. He shall keep a full and accurate record of all their doings; and he shall have special charge of all surveys and plans relating to the laying out, widening, extending and grading of streets.

“SECTION 13. Said Surveyor shall prepare all orders, resolves, and other papers relating to street widenings, extensions, and alterations which said committee may require; and shall furnish the City Solicitor with all necessary descriptions for deeds of land bought or taken to lay out, widen, or extend a street, or for any special contracts or agreements relating thereto.

“SECTION 14. Said Surveyor shall keep a set of books showing all the debits and credits to each estate, the whole or a portion of which may be taken to lay out, widen or extend a street, or which may be assessed under any Betterment Law; and if, in the opinion of the said committee, the work of keeping such a set of books and other records relating to street improvements, requires any special clerical assistance, the said Surveyor, with the consent and approval of said committee, may employ a suitable clerk, whose salary shall be fixed by said committee, and paid from the appropriation for laying out and widening streets. All bills for assessments made under any Betterment Law shall be deposited by said Surveyor with the City Treasurer for collection.”

Survey of Roxbury.

As soon as practicable, I would recommend that an accurate survey of all the streets in Roxbury should be commenced and carried forward as fast as the current work in this Department will permit; and the lines of the streets determined upon as far as they can be, from monuments on the ground, and from the plans and records of that city.

And I think it will also be found necessary to have profiles of all the streets made, showing the buildings, steps, fences, etc., so that grades can be fixed where they are not already established, and where, in some cases, it will be found advisable to change and revise the old grades formerly established.

The annexation of Roxbury must necessarily increase the work in this department very considerably.

East Boston Streets.

I would recommend that the lines of the streets in East Boston be permanently fixed by stone monuments placed in the ground in a similar manner to those fixing the lines of the streets in South Boston.

Notices of intention to build.

There have been received, at this office, Notices of intention to build five hundred and twenty-four buildings during the past year—two hundred and seventy-four in Boston Proper, one hundred and ninety-six in South Boston, and fifty-four in East Boston. The year previous (1866) there were received Notices of intention to build three hundred and seventy-two buildings; showing an increase of one hundred and fifty-two buildings in 1867 over 1866.

Undoubtedly more buildings have been built than the above notices indicate, as some persons omit to give notice,—the Ordinance requiring such notice to be given only on public streets.

Respectfully submitted,

THOS. W. DAVIS,

City Surveyor.

ANNUAL REPORT

OF THE

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Report for 1868

Out of print.

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FOR THE YEAR 1869.

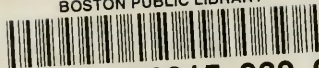


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